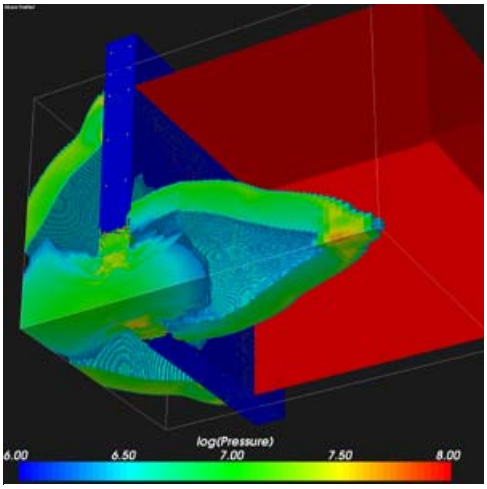
US Army Corps of Engineers®
Engineer Research and Development Center

ezVIZ

Technology

ezVIZ tackles visualization problems faced by the researcher in two ways. The non-interactive, batch visualization capability allows researchers to create images from their data while it still resides on the supercomputer. Once produced, these images, which are less than a few megabytes in size, can then be moved easily to the researcher's workstation for validity. ezVIZ is a cross-platform, open-source visualization system based on the Visualization Toolkit (VTK); Mesa, an open-source system for rendering interactive 3D graphics; and other available libraries.



Example output from ezVIZ showing a high-explosive blast as it breaches a reinforced concrete wall.

Problem

Extracting useful information from multi-terabyte data sets presents several problems to the researcher: transfer and storage of the data, graphics hardware to visualize the data, and visualization software capable of handling the data.

Expected Cost To Implement

ezVIZ is already deployed on most of the high performance computers (HPC) throughout the High Performance Computing Modernization Program (HPCMP). To use ezVIZ, users simply add commands to their batch submission scripts used to run their simulations so that when the simulation is complete, the images of the data can be generated automatically. The command used in these scripts is ezVIZGeneric. (See the DAAC Web site, http://daac.hpc.mil/ezviz, for complete documentation of how to use ezVIZ.)

Additionally for advanced users, there is an Application Program Interface (API) to the ezVIZ library. This provides a way for the power of ezVIZ to be incorporated directly into the researchers' codes so that simulation and data analysis can occur simultaneously.

Benefits/Savings

ezVIZ allows the researcher to directly visualize the data on the computer that generated it. This eliminates the need to transfer the data to dedicated visualization or analysis systems, and even allows the visualization to become part of the HPC job's output. ezVIZ boasts several features:

- Supports over 45 input formats, including images and structured and unstructured data.
- Supports 10 output formats, including images, extracted geometry, and/or animations.
- Provides for isosurface generation, hull extraction, cutting planes, streamlines, flow glyphs, volume rendering, molecule rendering, and data conversion.

- Supports both structured and unstructured data sets.
- Is capable of computing derived quantities from the input data as well as a wide variety of other input and output processing, such as reflecting, regioning, area of interest extraction, and triangulating.
- Is capable of running directly on most high performance computers in the Department of Defense High Performance Computing Modernization Program (HPCMP).
- Performs raw data translations for generating data suitable for use in the widely used interactive data analysis software tools: ParaView or EnSight.
- Offers both a stand-alone executable (ezVIZGeneric) and a C++ API.

Status

Version 1.4 is now available with the following features and enhancements:

- New VTK support with better memory management and improved stability.
- The ability to show in a single image the analysis of separate but related data sets, such as found in Zapotec or other coupled code simulations.
- Multi-variable volume rendering.
- Expanded calculator functionality by providing more advanced operations, including the ability to deform the input grid.
- Improved documentation, which can be found at http://daac.hpc.mil/ezviz.
- A Web interface to ezVIZ, which is currently under development.

ERDC POC(s)

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Distribution Sources

A complete list of systems is available on the Data Analysis and Assessment Center (DAAC) Web site at http://daac.hpc.mil/ezviz.

Available Documentation

Documentation for ezVIZ is available on the DAAC Web site at http://daac.hpc.mil/ezviz, and a Web-based Scene Generator is available at http://daac.hpc.mil/ez.

Available Training

Tutorials are available on the DAAC Web site at http://daac.hpc.mil/, and the DAAC is available to perform on-site training and tutorials to HPCMP users.

Available Support

HPCMP users can obtain assistance from the DAAC using the methods listed on the DAAC Web site at http://daac.hpc.mil on ezVIZ, as well as other related software.